

Coronary sinus iatrogenic lesion during repeated mitral valve replacement: case report of an immediate transmitral annulus repair

Lesão iatrogênica do seio coronariano durante reoperação para troca valvar mitral: apresentação de caso com imediata correção através do anel valvar

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Abstract

We report a case and evolution of a patient in whom the coronary sinus was damaged and reconstructed through the mitral annulus. The surgical accident happened during a degenerated biological valve prosthesis instrumentation. An almost complete left circumflex coronary artery division was our first hypothesis. A coronary probe introduced through the vascular injury was distally detected inside the right atrium confirming a coronary sinus lesion. The surgical correction was performed using running polypropylene 7-0 sutures through the mitral ring. After fourteen months, a coronary sinus angiographic image was taken observing the venous phase of selective left coronary arteriography. The image demonstrated an acceptable narrowing of the local venous repair. In our opinion the single coronary sinus division or its repair, in this iatrogenic situation, is a matter of speculation.

Descriptors: Coronary sinus. Mitral valve. Cardiac surgery. Heart valve diseases. Heart valve prosthesis. Mitral valve annulus.

Resumo

Apresenta-se a história e a evolução de uma paciente no qual o seio coronariano foi lesado e, imediatamente, reconstruído através do anel valvar mitral. O acidente cirúrgico aconteceu durante a instrumentação para remoção de uma prótese biológica degenerada. Uma quase completa lesão da artéria coronária circunflexa foi a primeira impressão. Um calibrador coronariano foi distalmente detectado dentro do átrio direito, mostrando tratar-se de uma lesão do seio coronariano. A correção cirúrgica foi realizada por sutura contínua com fio de polipropileno 7-0 através do anel valvar. Uma angiografia, realizada após 14 meses, mostrou apenas discreto estreitamento do seio coronariano no local da sutura, observando-se a fase venosa de uma arteriografia seletiva da artéria coronária descendente anterior. Os autores acreditam que a simples ligadura ou a reconstrução do seio coronariano, na condição iatrogênica apresentada, é motivo para especulações.

Descritores: Seio coronariano, cirurgia. Valva mitral, cirurgia. Valvas cardíacas, cirurgia. Prótese das valvas cardíacas.

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INTRODUCTION

Cardiac coronary sinus, left circumflex artery and electric pathways are anatomically related to the mitral valve annulus. An average anatomic separation of more than 10 mm between the coronary sinus and accessory pathways bridging the mitral annulus was measured at sequential distances from the coronary sinus ostium in 10 cadaver hearts [1]. Repeated mitral valve replacement, particularly in case of heavily calcified mitral annulus, may lead to iatrogenic injury of these cardiac structures. In addition, the posterior atrioventricular groove leading to hematoma, myocardial rupture and/or intracardiac shunt may be another iatrogenic problem. Intracardiac shunts have been described since the seventies and at least six cases have been reported [2-7].

In this text, we report the history and evolution of a patient in whom the coronary sinus was damaged and reconstructed, through the mitral annulus, due to repeated mitral valve replacement. We investigated the existence of publications as far as possible and, maybe, this surgical approach has not been reported previously.

CASE REPORT

A 41-year-old female had a bovine pericardium mitral prosthesis implanted 8 to 9 years previously. Her clinical situation was very good during four years after which she had adverse symptoms with effort. (Clinical Class III of the NYHA). Doppler echocardiography and heart catheterism evaluations confirmed a biological prosthesis degeneration and functional failure. The coronaries did not presented any atherosclerotic or another lesions. The mitral valve prosthesis replacement was made through a median sternotomy. After cardiopulmonary bypass stabilization, aortic cross-clamping and blood cardioplegia arrest, the mitral surgical access was performed by a left atriotomy. During the laborious old mitral prosthesis instrumentation, we observed a vascular structure closely related to a much-calcified annulus. An almost complete left circumflex coronary artery division was the first hypothesis. A very thin coronary probe was first proximally passed through the vessel, but its external palpation inside the aortic root was not possible. As we were afraid to damage the coronary artery, we tried to pass the coronary probe distally. To our surprise, this surgical maneuver was very easy and we detected the probe distally inside the right atrium. A small right atriotomy confirmed that the vascular structure was the coronary sinus. The venous structure had an almost 2-mm diagonally shaped lesion. After some theoretical considerations, which will be presented in the case report discussion, we decided to repair the lesion that was performed through a running polypropylene 7-0 suture. This

decision increased the cardiopulmonary bypass time in 40 minutes. After the coronary sinus surgical restoration the rest of the surgery was uneventful, replacing the degenerated biological prosthesis by a new bovine pericardium prosthesis. The immediate postoperative period was also uneventful and the patient was released after seven days. The congestive heart failure clinical signs and symptoms improved and a new cardiac catheterism was performed around fourteen months after the surgery. A coronary sinus angiographic picture was taking by observing the venous phase of the selective left coronary arteriography. This image showed an acceptable narrowing of the local venous repair (Figure 1).

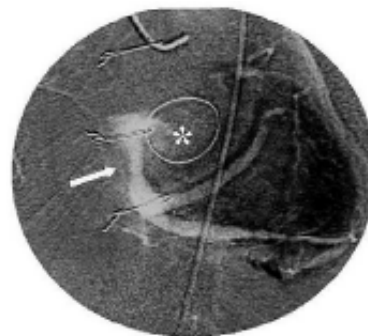


Fig. 1 – Venous phase of selective left coronary arteriography showing the contrasted coronary venous sinus. The arrow denotes an acceptable narrowing in the venous repair site and the asterisk denotes the mitral ring prosthesis.

COMMENTS

The coronary sinus is the anatomic structure responsible for the cardiac venous return. This vascular structure can be iatrogenically damaged in repeated heavily calcified mitral valve replacement, as happened in the present case report. This surgical complication is very infrequent. In six selected references [2-7], the reported cases presented as left ventricular coronary fistula. Three of them were diagnosed by Doppler echocardiography [3,4,6], and the other three cases were re-operated as peri-prosthetic leaks [1,2,5]. All these six cases presented systolic murmurs, which led to diagnostic investigations and consequent surgical treatment.

The consequences of coronary sinus lesion are a matter of discussion and speculation. Some of the reported cases presented cardiac heart failure in association with the left ventricle to coronary sinus fistula. Its progressive stricture to stimulate coronary circulation was myocardial revascularization an idea first proposed by Beck & Mako [8] in the forties based on GREGG AND DEWARDS experimental studies carried out in 1938 [9].

An interesting case was reported demonstrating for the

first time the angiographic appearance of coronary sinus thrombosis. This may have been the result of surgical trauma during mitral valve replacement or inadvertent coronary sinus cannulation during right heart catheterization or pacemaker insertion. Although the clinical significance of coronary sinus thrombosis is uncertain, its blood flow obstruction should not be deleterious because of multiple anastomoses between the coronary sinus system and the anterior cardiac veins. The coronary sinus thrombosis may be important as a source of pulmonary emboli. The prevalence of this serious complication requires further study [10].

A Japanese experimental study [11] was carried out to ascertain the effects caused by thrombosis in the coronary venous system of 21 adult mongrel dogs. The coronary sinus was abruptly obstructed to produce acute thrombosis. These dogs were then tested for serial changes of ECG, coronary arterial blood flow, left ventricular pressure, serum enzymes originating from the injured myocardium and histological changes of myocardium. The results obtained in these experiments were as follows: a) When the coronary sinus thrombosis was produced by the abrupt obstruction of the sinus, ECG patterns and serum enzymes originating from the myocardium showed changes similar to those of acute myocardial infarction; b) Histological examinations showed that the changes in myocardial infarction were characteristically similar to those of hemorrhagic infarction and; c) Despite the complete coronary-venous system thrombosis, the development of thrombosis or obstruction was not observed on the coronary-arterial side. This phenomenon is probably due to blood flow re-circulation through the Thebesian vessels.

In the present case, we observed a vascular structure damaged in the calcified mitral valve annulus. Our first impression was that it was the left circumflex coronary artery. To confirm our first hypothesis, a thin and malleable coronary probe was passed through the proximal and distal vascular lumen. When the probe was distally directed its olive was detected by palpation inside the right atrium. A small right atriotomy confirmed the probe through the coronary sinus ostium. We remembered Beck's ideas, the retrograde cardioplegia cannulae lesions and the coronary sinus thrombosis caused by electrode instrumentation. Indeed, we really decided to attempt coronary sinus reconstruction because we were not sure about the consequences of acute interruption at the mitral annulus level. The patient continues very well as a NYHA Class II, in a follow-up of eight years. The postoperative angiography confirmed the patency, and consequently the real surgical possibility to treat this complication. We followed the surgical and philosophical principle of "less mutilation and more reconstruction". If we could have just divided the vascular structure without any consequence is a matter of speculation, since we did not find any similar case report.

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